

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/GB 03/02426	International filing date (day/month/year) 04.06.2003	Priority date (day/month/year) 10.06.2002
International Patent Classification (IPC) or both national classification and IPC C07C2/76		
Applicant BP CHEMICALS LIMITED		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
 - ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 17.12.2003	Date of completion of this report 14.09.2004
Name and mailing address of the International preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Kardinal, S Telephone No. +31 70 340-3483 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB 03/02426

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-22 as originally filed

Claims, Numbers

1-19 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/GB 03/02426**

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application,

☒ claims Nos. 3-19 (partially)

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):

☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☒ no international search report has been established for the said claims Nos. 3-19 (partially)

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/ or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the Standard.

☐ the computer readable form has not been furnished or does not comply with the Standard.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-19
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-19
Industrial applicability (IA)	Yes: Claims	1-19
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Remarks

1.1 Present claims 3 and 4 relate to a process defined by reference to a desirable characteristic or property, namely the quantity of ethane produced in the process.

The claims cover all processes having this characteristic or property, whereas the application provides support within the meaning of Article 6 PCT and disclosure within the meaning of Article 5 PCT for only a very limited number of such processes. In the present case, the claims so lack support, and the application so lacks disclosure, that a meaningful search over the whole of the claimed scope has been impossible. Independent of the above reasoning, the claims also lack clarity (Article 6 PCT). An attempt is made to define the process by reference to a result to be achieved. Again, this lack of clarity in the present case is such as to render a meaningful search over the whole of the claimed scope impossible.

Consequently, the following reasoned statement has been carried out for those parts of the claims for which an international search report has been established, namely those parts relating to the process as defined in claims 5-19, in combination with claims 1 and 2.

1.2 Claims 1-19 are not supported by the description as required by Article 6 PCT, as their scope is broader than justified by the description and drawings :

The definition of the catalyst in claims 1-19 is extremely broad and vague whereas a catalytic activity and selectivity towards the production of ethane from methane is shown only for one type of tantalum catalyst (prepared according to example 1) and one type of tungsten catalyst (prepared according to example 4). It seems unlikely, however, that all metal compounds enclosed in the definition of claims 1-19 are suitable to catalyse the coupling of methane to ethane.

1.3 The term "catalyst grafted to a solid support" as expressed in claim 13 has no well recognised meaning.

1.4 The present wording of claim 1 is so vague that even the underlying reaction type (cf. page 3, lines 21-22 of the description or claim 6) is not clearly defined.

1.5 It is furthermore clear that essential technical features such as the reaction temperature and pressure (taking into account the high activation energy) and the nature of the catalyst are missing in claims 1 and 3.

Since independent claims 1 and 3 do not contain these features it does not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.

1.6 Preferably only one independent claim per category should be formulated.

2. Reference is made to the following document :

D1: DE 31 16 409 A (BABERNICS LUDWIG DIPL CHEM) 11 November 1982

3. Novelty

The subject-matter of the present application is not disclosed in the prior art (D1) and is therefore novel (Article 33(2) PCT).

4. Inventive Step

4.1 Concerning independent claims 1 and 3, document D1 is considered to represent the most relevant state of the art.

D1 discloses (cf. page 7-12) the non-oxidative coupling of methane to ethane using a catalyst selected from platinum, rhodium or rhenium powder or the corresponding oxides.

The reaction disclosed in D1 (cf. page 9, paragraph 2) is preferably performed in a fluidized bed reactor having a positional temperature profile throughout the reactor permitting the chemisorption of methane and recombination to ethane in a single stage process.

4.2 It is noted that the high selectivity towards the production of ethane is

achieved in examples 2, 3 and 5 only for little methane conversions of 0.018 % to 0.227 % in which subsequent coupling reactions of produced ethane are unlikely to occur due to the high dilution.

The present application does not contain experimental data allowing a comparison with the process of D1 (taking into account the conversion).

4.3 The problem to be solved by the present invention may therefore be regarded as provision of an alternative process for the production of ethane from methane.

4.4 The solution proposed in claims 1 and 3 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) :

The catalytic coupling of methane to ethane is already known from D1. The acknowledgement of an inventive step for the present application could only rest, therefore, on the presence of an unexpected technical effect or advantage resulting from the choice of special reaction conditions (e. g. the specific nature of the catalyst). It is furthermore necessary that this technical effect can be expected over the whole scope of the independent claims.

In the present case it seems unlikely that any technical effect could be present over the broad scope of claims 1 or 3 (cf. point 1 above) and it has to be regarded as the result of routine work to modify the process of D1 such as to arrive at the subject-matter of the present application.

4.5 Dependent claims 2 and 4-19 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of the inventive step.